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INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

Farming in Tsetse Controlled Areas

FITCA

FARMING IN TSETSE CONTROLLED AREAS
FITCA

Environmental Monitoring and Management Component

E M M C

Project Number : 7.ACP.RP.R. 578

Training workshop on the safe use of insecticides in three tsetse fly infested regions

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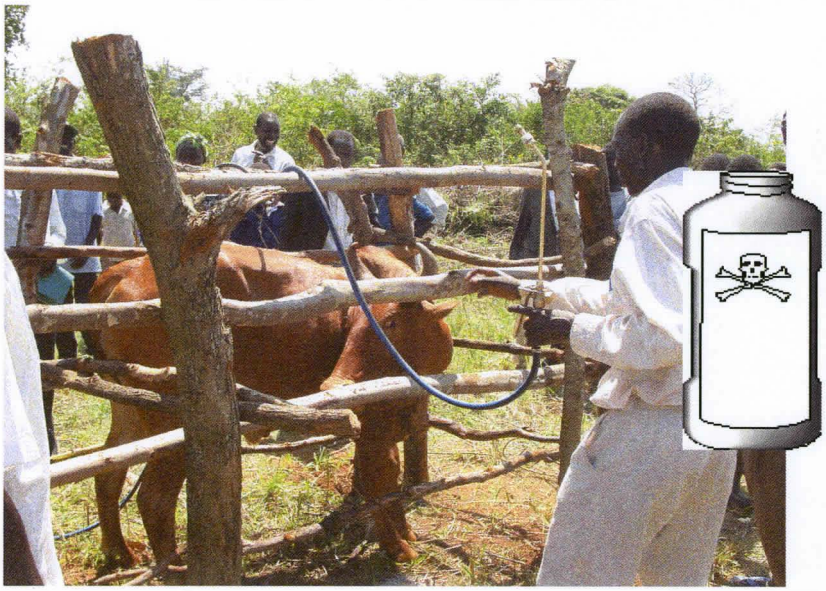
7th June and 22nd July 2004



Natural Resources Institute

FITCA EMMC Report Number P1

CIRAD

The Safe Use of Insecticides Training Workshops in three Tsetsefly infested regions.

(Busia, Kenya; Jinja, Uganda; and Bukoba, Kagera; Tanzania).

Work carried out between 7th June and 2nd July 2004

Consultants report to ILRI, FITCA/EMMC.

FITCA-EMMC

TERMS OF REFERENCE FOR SHORT TERM CONSULTANCY

Training in safe handling, use and disposal Of insecticides for tsetse control

Background of the programme

Human and animal trypanosomosis transmitted by tsetse flies present important constraints on human health and livestock productivity in Kenya, Uganda, Tanzania, Rwanda and Ethiopia.

The FITCA programme has been implemented to improve the livelihood of the rural population and reduce poverty by helping farmers to control tsetse fly, to increase livestock productivity and to enhance agricultural production by improving their agricultural system.

The European Union finances the FITCA program with regional and national indicative funds under the IDF VII, agreement #5682/reg. The regional Tsetse co-ordination unit based at AU/IBAR offices supervises the FITCA national programmes.

Funded by the EU, the Environmental Monitoring and Management Component (EMMC) is part of the regional FITCA program. EMMC is contracted to ILRI (TAC signed on March 28th 2001 for two years, extended until December 2003, and new TAC signed on February 28th 2004 until December 2004). EMMC is supporting FITCA national programmes in terms of assisting with the formulation of plans to reduce the likelihood of impacts of the tsetse control techniques applied.

Resource consultants

Mrs Judith Mutea

Dr. John L. Aston

Summarised Achievements

The three planned training courses were successfully achieved. Overall evaluation of the courses by participants indicated a high degree of satisfaction despite wide background divergence of those being trained.

Overall 60 people were trained including MOA extensionists, veterinarians, stockists and farmers.

Twenty four sets of 8 each CropLife Africa Middle East Safe Use posters were distributed and forty one complete sets of training notes given out.

CropLife brochures were also given out in Bukoba.

Introduction

Three training workshops were held:-

1) With FITCA Busia
2) With FITCA Jinja
3) With FITCA Kagera region

The workshops involved two days at each location, 20 participants were invited and a full turnout was achieved in all places.

Participants in Busia and Kagera included veterinarians, extensionists, stockists and farmers. In Jinja the farmer contingent was not included.

The workshops were well organized at the local level in all locations. Thanks go to Doctors Orot, Gidudu and Omollo for their hard work.

Activity reports on workshops

I. Busia

II. Jinja

III. Kagera region

Safe Use of Insecticides, Training Workshop in Tsetsefly infested areas

1. FITCA Busia in Kenya

Date: **Monday 7th – 12th June 2004**

Objectives:
To provide training to some 20 key people in the Busia division to enable them to further train local smallholder farmers in all areas of Safe Use of Insecticides to avoid risks of poisoning incidents when livestock insecticides are used.

Monday 7th June

Travel, Nairobi – Busia by car, arriving at 20.30 hours. Meeting with FITCA regional co-coordinator Dr. Stephen Orot. Brief review of the programme.

Tuesday 8th June

8.30 a.m. Met Dr. Orot for detailed review of the weeks activities and final planning for training. Met the finance officer and other office staff.

Itinerary for the EMMC visit to FITCA Kenya project in Busia

Day	Activity
Tuesday 8th June	➢ Visit two farmers using insecticides. (Messrs. Nyakundi and Kitonga – Municipality) ➢ Visit Municipal waste site and slaughter house ➢ Visit Suo river water supply ➢ Visit two pesticide shops (Busia Agrovet, Giathi and Multivet)
Wednesday 9th June	Livestock Spray at Lukure, Funyula
Thursday 10th June	TOT trainers
Friday 11th June	TOT Trainers

Field visit programme with Dr. Orot.

Meetings included:-

Meeting with Stanley Ambasa the Environmental officer for the District, he was also the wetlands protection officer, worried about increasing levels of water pollution in the district.

Met lead farmers, Nyakundi, Okindo, Boniface Odongo, Mr.&Mrs. Kitonga all smallholder farmers, practicing zero grazing (4-5 adult cattle and followers). All clearly benefiting from FITCA programme, (Grade cows, few or no health problems in herd)

Visited the local water supply for Busia – the Sio river situated in wetland area with quality agricultural crops in the area.

The local sewerage disposal site was visited – the site was clean and no adverse environmental effects were seen.

Visited two stockists in Busia, Busia Agrovet and Multivet Agricultural supplies. Both stores were well run with a good range of quality, ethical products. Not too much protective clothing was stocked and spray pumps were not of the best quality. The animal health product range was particularly well catered for with plenty of small packs available.

Safe Use Notes from the day

- Protective clothing – most farmers visited used little, none, or only when they felt like it. Awareness was there!
- Storage – not a lot of chemicals were stored, however more care was needed.
- Disposal, care was taken in this area, used containers were either buried or incinerated. There were comments that some of the smallholders in the rural areas still re-used containers for storage of household liquids.
- Visited the venue for the training and liased with management needs.

Notes from farmers on FITCA project

Farmers visited felt that the project has been a major success – lead farmers were now getting 14-15 litres of milk per day from their grade cattle. Many rural smallholders were upgrading their herds using artificial insemination (a.i) technology to introduce Grade class animals. This would not have been even considered five years ago. The level of trypanosomiasis infected tsetse flies has decreased significantly in the last years. Estimated over 10% in 1999, down now to an estimated 2-3%. (this is the % of tsetse flies that carry the sickness parasite). Tsetse fly populations have also been greatly reduced.

Wednesday 9th June

Set out to visit a cattle crush site with Dr. Orot and David Gitau in the Funyula area, Ageng'a community (9.00a.m.)

FITCA started work in the Western province in 1999. work in Uganda also started in 1999, Tanzania 2000 and Rwanda 2004.

Farm sizes in the area were usually 5-10 acres.

FITCA taught farmers to cut bushes and set traps (visibility to flies). Traps were blue coloured (a colour attractive to the flies and cattle urine was sprayed in the area as a further attractant.

FITCA took farmers to Uganda where technology was ahead of local practice in 2001 and assisted in organizing the farmers into community groups. These groups organized site selection for crushes, the programme generally worked well although there was occasional meddling by influential locals who tried to control them.

FITCA subsidized stirrup pump purchases to the extent of 60% and provided the first 1 litre pack of insecticide (Decatix) free for the treatment of 500 adult cattle. FITCA then allowed the local farmers to 'own' their projects using elected committees.

A local member of the crush committee James Bosire Ocholla informed us that committee duties were rotated. Their adult cattle were treated at Kshs.15/= each every 14 days using 2 litres of a spray mix containing 1c.c./litre of product.

Their spraymen used PPE equipment (Overall, gloves, boots and mask). Children were not allowed in the area, more training at the local level was needed. Chemicals were transported separately from food and animal feed.

It was added that sprayed cattle also acted as targets to assist in the reduction of Tsetse populations. The practice was very successful when the majority of local cattle were treated. Farmer Ocholla told us that disease incidence in both humans and cattle was now "very low".

On return (p.m.) the seminar venue was set up and final preparation completed. (photocopy work, setting up of demonstration materials).

The workshop programme (for all venues) was discussed and agreed.

SAFE USE OF INSECTICIDES

TRAINING OF TRAINERS COURSE FOR LIVESTOCK OFFICERS AND COMMUNITY LEADERS IN TSETSE FLY INFESTED AREAS

COURSE AGENDA 2 DAYS

Day 1

9.00 a.m.-9.30 a.m.	-	Registration / Personal profiles
9.30 a.m.-10.00 a.m.	-	Introduction and course objectives

10.00 a.m.-11.00 a.m.	-	Introduction to Pests and Diseases of livestock
11.00 a.m.-11.30 a.m.	-	T E A B R E A K
11.30 a.m.-11.45 noon	-	Official opening
11.45 a.m.-12.30 p.m.	-	Purchase, transport and storage of pesticides
12.30 p.m.-1.00 p.m.	-	Discussion group work project
1.00 p.m.-2.00 p.m.	-	L U N C H
2.00 p.m.-3.00 p.m.	-	Pesticide Label, Toxicity and Colour Codes
3.00 p.m.-4.00 p.m.	-	Classification, Formulation and mode of Action of pesticides.
4.00 p.m.-4.45 p.m.	-	Protective Clothing (PPE) and their Maintainance.
4.45 p.m.-5.00 p.m.	-	T E A B R E A K
5.00 p.m.-	-	Community training concept

Day 2

9.00 a.m.-9.30 a.m.	-	First Aid measures and Disposal of pesticides wastes
9.30 a.m.-10.30 a.m.	-	Sprayers and spraying skills
10.30 a.m.-11.00 a.m.	-	T E A B R E A K
11.00 a.m.-12.00 noon	-	Group work presentations / discussions
12.00 noon.-1.00 p.m.	-	T E S T

1.00 p.m.-2.00 p.m.	-	L U N C H
2.00 p.m.-2.30 p.m.	-	Environmental Impact
2.30 p.m.-3.00 p.m.	-	C O U R S E E V A L U A T I O N
3.00 p.m.-4.00 p.m.	-	Wrap up / presentation of Certificates.
OFFICIAL CLOSING	-	**FITCA / EMMC**

Thursday 10th June

Training seminar – carried out at the conference center of the, Busia Country Travelers Hotel. The full complement of the 20 invited participants arrived in good time to start proceedings at 9.15 a.m.

Participants

These were drawn from the five District (Busia, Bungoma, Bondo, Siaya and Teso). Participants included MOA Extension staff, Farmers, FITCA staff, private Vet's (stockists) and a member of the local Environmental protection office.

Name	*Position*	*Contact*
1. Ferdinard Mangoli Munyalo	Crush secretary	Box 1 Kabula /Bondo
2. Moses Etyang Omose	Farmer	Box 14 Malakisi
3. Gidraph Kamure	Farmer	Box 14 Amagoro
4. Aggrey .O. Odeny	DAO - Bondo	Box 113 Bondo
5. Meshack Were Oluoch	Farmer - Nyamoye	Box 137 Siaya
6. Aloise Ndaga	Farmer – Siaya	Box 137 Siaya
7. Justo Majale Oundo	Farmer - Funyula	Box 116 Funyula
8. Churchill .J. Amatha	District Horticultural Crops Officer- Bungoma	Box 33 Bungoma
9. John Mutenyo Kanyanya	Senior Zoologist from MOA Bugoma	Box 135 Bungoma

10. Kitonga Sophina	F.T.C Manager Busia	Box 28 Busia
11. Anyango J. O.	Zoologist attached to the FITCA Project in Siaya	Box 529 Siaya
12. Paul Oduor Kodero	District Farm Management Officer - Siaya	Box 3 Siaya
13. Clement K. Wangai	The Hydrologist – Working with the Busia District Environmental office/water resource management	Box 392 Busia
14. Malachi Ogonji	MOA Lands Officer working in Bondo.	Box 430 Bondo
15. Dr. Otieno M. O.	A Private Vertinary surgeon working with his own stockists business in Bondo	Box 430 Bondo
16. Dr. Mogaka S. O.	Private Vertinary surgeon with his own stockist business in Bondo.	Box 703 Busia
17. Dr. Oloo B. J.	Private Vertinary surgeon with a stockist business in Siaya.	Box 33 Sega
18. Ogwang T. Jomo	The District Crops Officer MOA Busia	Box 28 Busia
19. Joseph M. Gitau	A Zoologist assigned to FITCA Busia.	Box 261 Busia
20. Kisingu Mawioo Joseph	MOA assigned to FITCA	Box 56 Bungoma

The seminar programme is included as attachment 2 at the back of the report.

The seminar was formally opened by the District Officer, Mr. Odindi who stood in for the District Commissoner, Busia who was attending a meeting in Bungoma.

Safe use messages were itemised early in the proceedings – there was much discussion on the aspect of the need to purchase products from reputable licensed stockists only.

The participants were then divided into five groups by district to outline problems noted at the local level with particular reference to safety issues.

There was a close similarity in findings of all five groups. Key issues, the need of tighter implementation of Pest Control Products Board vertinary drug inspectors legislation and the clear need for more training at the local level were identified.

Problems listed, included:-

- The need to educate smallholder farmers to purchase products from ethical stockists only (not from market vendors or itinerent salesmen) many farmers still looked for cheapest products available.

- The presence of poor quality, unlabelled, fake and smuggled products on sale in markets and with small rural "stockists"

- The operators of the small rural outlets frequently lacked any training and were unable to give advice to the farmers.

- Poor labeling of some generic formulations.

- "Fake" contractors in the market conning smallholder farmers with cheap and ineffective treatments.

The above problems would benefit from extra Pest Control Product Board activity in the region, bearing in mind that cross border activity was still significant.

In terms of more training needs:-

- Inexperienced stockists need special training, particularly as many farmers have the opinion that stockists will "try to sell them anything"

- Farmers failing to follow label instructions (over/under dosing).

- Farmers involved in both livestock and vegetable growing failing to observe or understand "safety" intervals between the last insecticide application and harvest.

- Poor storage of products and carelessness.

- Lack of knowledge on the correct timing of applications, (not during heat of day, not spraying against the wind or when it is raining etc).

- Rural farmers were not always disposing of products, containers properly. Some reuse of containers still reported. Some repacking still reported and some disposal of these in pit latrines.

- Inadequate use of protective clothing recorded – stockists should stock more.

- Use of poor equipment – bare hands when washing animals, use of branches and poor pumps.

- Following this lively discussion the workshop programme proceeded as per schedule covering other related safety aspects.

- The session closed at 19.00 hours.

Conclusions from session

1. More inputs from the Pest Control Product Board would be greatly appreciated in this border province.

2. The participants at this "Train the Trainers " seminar have plenty of future work to do to raise standards relating to the safe use of insecticides at the rural / pastorialists level. Seminar presentations were supported in the late afternoon / evening by relevant videos that underscored all relevant messages. Copies of these video's were asked for by district participants.

Friday 11th June

Participants arrived early and work started before 8.30 a.m. as some members wished to finish a little earlier as planned in order to reach distant areas of the division before nightfall.

Community Training Concept

A second group session was set up as per districts Bondo, Siaya, Bungoma, Teso and Busia (same groups) to formulate a one day training programme for rural farmers – to ensure that as trained trainers they would be able to organize, budget for and to run a safe use programme in their respective divisions / villages.

The groups participation in this exercise was excellent with minor divergences in the timing of events and whether or not to provide lunches / or refreshment to participants (rural farmers). Groups recognized that farmers had jobs to do early in the morning and arranged sessions to start relatively late (9.30 – 10.30) and also that trainings should not exceed five hours.

When it came to planning budgets for a session all groups understood the need to cater for items such as ensuring that allowances were made for fuel, stationery, per diems (lunches) for resource staff etc. Four of the five groups calculated that a single farmer training session for around 30-40 pax would cost between Kshs.7,000/= to Kshs.10,000/=.

Knapsack and stirrup pump sprayers were demonstrated, nearly all participants understood that the stirrup pump application had more advantages to offer in terms of quality application of insecticides (better penetration through the pelt of the animal for proper coverage with high pressure).

Dr. Wangai, the Environmental Agency hydrologist attending gave a short presentation on environmental problems in the Busia division, highlighting worries about the deterioration of water quality in the area and the menace of large quantities of plastic wastes. He appreciated the training and said that if safe use messages were carried out by the farmers river pollution would be reduced.

Increasing levels of phosphate and nitrates in local rivers were the main cause of their concern. It was pointed out that the livestock sector used very small quantities (relatively) of insecticides and that their use, well away from water, was not likely to pose (any) problems in the area. A cattle crush treating 100 cows every fourteen days only consumed, for example 10 grams of active deltamethrin per session or a few more grams of amitraz.

Following further discussions participants were asked to sit for a small written test to confirm that they had understood seminar messages. Most participants scored over 80% when results were marked.

Following testing the participants were asked to evaluate the value of the course to them – the results of this were highly positive. Copies of the "test" and the evaluation form appear as attachments 3 and 4.

ILRI certificates were presented to participants just prior to closing seminar by Dr. Orot who had participated actively during the two days of meetings.

Dr. Orot closed the seminar with a short speech thanking the participants for their presence and quality contributions.

A farmer Alois Ndaga thanked FITCA for organizing the seminar that enabled them to have direct contacts with the extension staff and the vertinarians, and said also that they had benefited a lot from the proceedings and would take the message back to their fellow cattle crush members.

The resource team would like to put in writing their sincere thanks to Dr. Orot and his team in Busia for their substantial assistance in organizing seminar arrangements.

Handouts

All participants were given a full set of training notes.

Key participants (Extension officers) were given full sets of CropLife SUP posters.

For further training use (Six sets of 8 posters) were issued.

Safe Use of Insecticides, Training Workshop in Tsetsefly infested areas

II. Jinja in Uganda

Date: **Monday 14th to Friday 18th June 2004**

Objectives:

To provide training to some 20 key people in Jinja region to enable them to further train local smallholder farmers in all areas of Safe Use of Insecticides to avoid risks of poisoning incidents when livestock insecticides are used.

Monday 14th June

Set off from Busia 8.45 a.m. to Jinja. Arrived 12.45 p.m. 1½ hour delay at Ugandan Customs. Junior officers were obstructive when no bribe was forthcoming.

Met sociologist, Anna Rutebuka who was expecting us. Had a brief meeting on programme as Dr. Gidudu was unwell. After lunch programme details set out and planning for Tuesday outlined. Visited the conference venue at the Sunset Hotel and discussed details and arrangements in the absence of Dr. Gidudu.

Met FITCA Entomologist Fred Kabaale from Kamuli office and fixed field visit to his area.

Tuesday 15th June

Left Jinja at 7.45 a.m.

Set off with Joseph Kukoma to Nwamwenda at 07.45 a.m. arriving at 08.45 a.m. where we met with the area Entomologist Fred Kabaale.

Meeting session where the infestation problems in the area were explained. Much of the area had serious infestation and sickness levels. Fly density was measured by the number of insects trapped per day in their insecticide treated conical traps. (0-1 flies day – light infestation, 1-5 flies day moderate/heavy, over 5 day heavy). FITCA concentrated work in areas with moderate/heavy infestations and where human and animal sickness levels were most serious. (Nwamwenda 1-5 flies 1 day).

We were introduced to the District Veterinary Officer, Dr. Kiiza Waako and the local council chairman, Mr. Katawera.

Travelled on to Bugondha, a heavily infested parish area, with the local officials.

We inspected the local crush pen and met a group of about 30 farmers, all of whom had brought cattle in for routine spray treatment. (every 14 days).

The spray treatment operation was demonstrated to us, before speeches from the DVO, chairman, area co-coordinator and the local crush chairman. A typed parish report was made available to us.

Information provided included:-

- Before FITCA interventions an estimated 20% of Tsetse bites were infective. Now, fly density much reduced and infective levels very low.

- Spraying started in 2002 and is done every 14 days. After the first free 1 litre of Decatix the farming group were now using the fourth bottle that they had purchased themselves. Farmer paid Ushs.300 per head treated to finance this and crush maintenance.

- Most farmers work with the community project, only a very few operate independently.

- Around 100 cattle, all in good condition, were around for treatment whilst we were there.

- FITCA had provided the group with a stirrup pump and protective clothing.

One of the groups main problems was that they were having serious difficulties meeting banking conditions to open an account. FITCA were assisting by giving the community a letter to try to help.

Comments on the spray application

Overall the spraying operation was very sloppy and, if ever more poisonous products than deltamethrin and amitraz were used it would rate as an incident waiting to happen.

- Mixing was not very accurate.

- Protective clothing was worn but it looked very much as if it was put on for our benefit. No boots. It seems from discussion that it is not really used despite being presented free by FITCA.

- Stirrup pump (also free or subsidized by FITCA) was leaking badly and the operator, working in sandals had wet feet from spray mix all the time. (poor maintenance?).

- The containers used to mix and hold spray liquid were, despite information to the contrary, clearly standard household materials.

- Insecticide storage was probably in the house, without special provisions. The pack was also left around the crush without proper supervision during use.

- Old packs were not rinsed and could be used to store household liquids.

- Spray cover of the cattle was not complete (one sided only) and no respect for wind directions made (we were informed).

The groups were interested and very supportive of their committee but still need time to adjust their mentality to become self-sustaining.

Despite huge benefits in terms of reduced vertinary bills and loss of animals they are still expecting FITCA to give them "help" by way of subsidized or free product or equipment. The need to become sustainable and self-sufficient was emphasized to them by the D.V.O.

Following this most interesting and informative session we had a second meeting with a similar farmers community group in Nyamwendo. Visit was introduced by Mr. Musa Twefeku the cattle group leader. The problem here was the same as in Bugondha – expensive product, need for more FITCA help etc. here the group had decided to share out the protective clothing, i.e. boots for the chairman, overalls for another committee member etc.!!

The group also thought that FITCA blood sample taking for parasite assay were samples actually being taken for sale!!

Both groups however thanked FITCA sincerely for their involvement in their work, which had seen infection, and fly levels drop dramatically since the project started.

We eventually returned to Jinja at 16.45 hours to set up the training hall for the workshop, due to commence Wednesday 16th at 9.00 a.m.

Wednesday 16th June

Arrived at the workshop center at 8.30 a.m. to finalize arrangements and await participants that were due in from the 12 surrounding districts.

List of Participants

Name	*Position*	*Contact*
1. Dr. George Hasafu Were	DVO – Mbale	Box 81 Mbale
2. Frank Akena	SAO/Land use Manager	071-700572
3. Anne Asinde	FITCA Coordinator-Tororo	077-690427
4. Muguwa Joseph	Entomologist - Jinja	077-852934
5. Dambya Ambrose	Entomologist - Pachisa	077-849646
6. Dr. Ouma Mukoche	DVO/FITCA Coord./Mayuge	077-421908
7. Dr. Magirigi Xavier	DVO – Iganga	075-622379
8. O'bayi Avucha	Entomologist – Iganga	075-658047
9. Dr. David Mugabi	DVO - Kayunga	071-453164
10. Nassozi Annette	Entomologist - Mukono	077-489075
11. Kalamagi Collins	Entomologist - Wandegiya	071-801730
12. Ibanda Musa	Agriculture Officer - Jinja	071-367535
13. Kyalingonza Peter	Entomologist – Busia	077-555280
14. Dr. Wejuui Alfred	For DVO – Prugiri	077-486021
15. Dr. Joseph Thaddeus Odimim	Component Manager Vet.	077-572968
16. Fredrick Luyimbazi	Principal Entomologist	077-575326
17. Gidudu Ambrose	National Co-ordinator FITCA	077-669021
18. Andrew Kalima	Community Health Worker	-
19. Fredrick Kabaale	Entomologist – Kamuli	077-482119

The workshop session closed at 18.45 hours after group discussions and a safe use video was shown.

Problems listed by the participants included:-

- Quality and availability of both protective clothing and application equipment.

- Observation of safety intervals between last application and milking / slaughtering of animals.

- General 'sloppy' use of products and utensils. (Poor storage, poor use of protective clothing, no respect to wind direction) lack of knowledge at farmer level.

- Wrong use of product.

- Need for tighter control of products at the stockist level. (However the fake, smuggled products problem found in Busia was not emphasized here).

- The need to train smallholder farmers and create awareness was emphasized.

- Products should only be sold by trained and qualified stockists.

- Possible adulteration of products by both stockists and farmers.

- Poor hygiene practices after application – risk of third party incidents.

- Too much repacking in the market.

- Stockists not giving adequate advice to farmers whose English is poor.

Thursday 17th June

Set up meeting from 8.30 a.m.

Safe use messages continued.

A group exercise to assist trainers eventually planning smallholder farmer training sessions was carried out.

The groups all had the correct basic programme requirements but courses planned were, in the main, expensive and we felt that they could have been better directed at smallholder groups in the villages. What was given, was the Ugandan traditional training sessions.

Local trainings need to be given in the local language (not English) and trainers understood the need for courses to start later, as farmers had routine daily duties before they could come for training. Also it was pointed out that farmers had limited concentration spans and that a session limit of five hours was the most that was advisable.

The meeting was closed at 15.45 hours by the principal Entomologist Fredrick Luximbwazi who spent some time outlining problems and the need to do more awareness training with the smallholder farmers.

Thanks go to Dr. Gidudu and his team for handling all the local arrangements!

Handouts

All participants received a full set of Safe Use Training notes for future use.

Six full sets of SUP training posters were given out.

A further six sets of 8 posters were promised to Dr. Gidudu on the occasion of his next visit to ILRI at the end of the month. (i.e. to be one set for each of the 12 districts).

Friday 18th June

Return to Nairobi arriving at 16.30 hours.

Safe Use of Insecticides, Training Workshop in Tsetsefly infested areas

III. FITCA Bukoba in Tanzania

Date: **Monday 28th June to Friday 2nd July 2004**

Objectives:

To provide training to some 20 key people in the Kagera region of Tanzania to enable them to further train local smallholder farmers in all areas of Safe Use of Insecticides to avoid risks of poisoning incidents when livestock insecticides are used.

Monday 28th June

Travel Nairobi – Bukoba - by air Nairobi – Entebbe, car Entebbe to Bukoba, arriving 19.00 hours.

The road journey was very long and expensive – decision made to amend return plans to fly by local airline direct to Nairobi.

Met Dr. Omollo and had a brief review of programme from 21.00 hours to 22.00 hours.

Tuesday 29th June

Detailed review meeting with Dr. Omollo.

Amended budget, reviewed programme for workshop to be held Wednesday / Thursday.

Reviewed the status of the FITCA project in the region which started 3 years after work in Busia and Jinja (in 2002).

Visited Bukoba with Dr. Omollo to settle several last items for the workshop (photocopies, purchase flip charts etc), visit the Bank to change dollars.

NOTES

Smallholder farmers still preferred to purchase cheapest products.

Steladone was very heavily stocked, however, much to much was seen in 1 litre packs which were too large for most smallholders (much repacking!), Decatix was currently not available although it has been widely sold over the years.

The FITCA involvement in the region was essentially a pest monitoring role at this stage. Much community work has been done to enable local groups to assess pest densities and significance so as to know when spraying was needed.

FITCA teams have also been giving advice to farmers at the village level on a range of relevant issues.

Dr. Omollo reported that as well as monitoring tsetse populations, the team was active in keeping a close watch on tick populations and endo-parasites.

Deltamethrin has been widely used in the region these last 14 years and fly populations have been greatly reduced – it has been noted that tick borne diseases have become more prevalent in the last few years.

Wednesday 30th June

The set up for the conference room was completed and all participants were in place for a prompt 09.00 hours to start.

List of Participants

Name	*Position*	*Contact*
1. Issa Majaliwa	Stockist	Box 41 Kagera
2. Yusuf Shabani	Lead Farmer Trainer	Box 498 Omulusimbi
3. Dr. Kisanga W. Makigo	Veterinarian	Box 1713 Bukoba
4. John K. Mbyazita	Stockist / Extensionist	Box 18 Kyaka
5. Renatus Theonesit	Lead Farmer Trainer	Box 190 Nkwed
6. Israel Stanslaus	FITCA-Secretary	Box 704 Rubaze
7. Imelda Achayo	Stockist	Box 249 Bukoba
8. Dr. K. F. Musoke	DVO - Bukoba	Box 1713 Bukoba
9. Martin K. Ladislaus	F.O.	Narco-Kikulula
10. Dr. Pius O. Aenda	AVO	Box 217 Karagwe
11. Dr. Laurean A. Deogratias	FITCA - Bukoba	Box 1717 Bukoba

12. Dr. Valerio P. S. Kiputa	DVO	Box 22 Karagwe
13. Paul .M. Mubirigi	Extensionist	Box 22 Karagwe
14. Thomaides William	Lead Farmer Trainer	Box 22 Bugoloka
15. Dausoni J. Rutalomba	Lead Farmer Trainer	Box 103 Karagwe
16. Deus .I. Kalangari	Livestock Extensionist	Box 22 Karagwe
17. Flex Bishashar	Lead Farmer Trainer	Box 22 Karagwe
18. Dr. Omollo Silas	Regional Coordinator FITCA – Kagera	Box 1717 Bukoba
19. Eustard Shumbusho	Stockist (Kolping)	Box 1236 Bukoba
20. Imotto Herema	Stockist (BPS Agrovet)	1616 Bugerba

The workshop was opened by Dr. Omollo following registration. The Divisional Veterinary Officer, Dr. K. F. Musake gave a detailed presentation on the livestock pest and diseases problems in the region. (report as attachment 5)

Tickborne and endo-parasites problems had recently overtaken Trypanasomiasis as the main disease causing agents. Decatix had been used extensively over the last fourteen years and Tsetse fly populations have been much reduced.

The participants were then divided into four groups to discuss and report on the particular problems that they were facing in the region (farmers, veterinarians, stockists and extension specialists).

Problems outlined included:-

Extensionists

- Not enough training at the farmer level
- Unqualified stockists
- Farmers purchasing product from unreliable suppliers
- Lack of antidotes to treat poisoned animals
- Lack of precautions when using insecticides

Stockists

- Unavailability of full range of products
- High procurement costs
- Availability of cheaper products from neighboring countries
- Disposal of expired products
- Briefcase vendors
- Shortage of information on products and their availability, particularly new products entering the market.
- Need for major suppliers to carry out more training

Veterinary Officers

- Lack of policy direction at the Government level
- See farmers using insecticides improperly (cocktails, under dosing)
- Presence of far too many unqualified stockists
- Too much repacking (N.B. Steladone!)
- Farmers using no protective clothing
- Improper disposal of containers, environmental pollution and poisonings
- Need for suppliers to supply more small packs to stockists

Farmers

- High price of products
- Long distances to obtain products, tendency to purchase from untrained stockists in village or go into Rwanda
- Cost of obtaining expert extensionist help (need to pay for petrol for transport) and shortage of extension services
- Availability of inputs and untrained vendors
- Lack of education

Discussion on session

In discussion it was apparent that the region had serious marketing and distribution problems. The region was large and relatively thinly populated. As such the market was diffuse with slow business for the key stockists in the few towns.

Equipment and Personal Protective Equipment (PPE) were not attractive business propositions for stockists in these situations and it looks to be a difficult weakness to remedy.

The encouragement of community group development in the region could be an eventual partial answer to such problems. (enough business for key stockists to visit?, communal purchasing? A stockist contact in the community group?)

The session continued with a series of 'routine' safe use messages before the four groups were put together again with the set mission to plan a one day training session for a group of smallholder farmers. The day closed at around 19.15 hours when the programme plans were completed.

Thursday 1st July

Participants arrived promptly and the workshop was underway before 8.00 a.m.

Safe Use messages continued before the group exercise results were presented and discussed. All groups covered the key training issues well; the farmers and extensionists presented training budgets that were very much in line with possible availability of future funding. The veterinarians and stockists presented concepts that were on the expensive side – the stockists wanting to bring teams of farmers into town for the training programme, which was not what was really wanted.

The groups all hoped that some funding could be found to carry out further trainings.

Following discussions participants completed an examination to assess how well the Safe Use messages had been understood. The extensionists, veterinarians and most stockists performed exceptionally well, many scoring 18 or more out of 20. the farmers struggled despite having all messages translated into Swahili for their benefit.

However – they all answered the key Safe Use message question correctly.

Discussion continued after lunch and was followed by the course evaluation.

The workshop was closed by Dr. Omollo at 15.00 hours to enable participants living in distant locations of the region to return before nightfall.

Friday 2nd July

Went through expenses with Dr. Omollo and collected Workshop returns to bring back to Nairobi.

Left Bukoba at 11.30 a.m. arriving Nairobi at 3.30 p.m.

We would like to express our thanks to Dr. Omollo and his team for their efforts to make the workshop a success – their hard work was greatly appreciated. Also, Dr. Omollo worked hard as an interpreter to ensure that some of our farmer participants fully understood Safe Use messages.

The Bukoba location was ideal for workshops of this type and FITCA could well consider it as a venue for future regional meetings.

Handouts

- Six full sets of CropLife posters were given, four to the FITCA co-ordinator, two to the stockists who agreed to share them.

- Ten copies of an "Effective Spraying, a spray operators guide", were given out to relevant groups (courtesy of ZEGA)

- A copy of the course lectures was given to Dr. Omollo for further copying to trainers.

- Copies of CropLife guidelines on the Safe and Effective use of Crop Protection Chemicals, Guidelines for Emergency Measures in cases of Crop Protection Product Poisoning and the AAK Safe Use of Pesticides booklet in English and Swahili were left with FITCA co-ordinator.

General comments on the three workshops

a) On trainings

b) Environmental impact

c) Recommendations

Trainings

There was clear evidence that farmer knowledge of safe use practices was minimal at all locations.

There were serious gaps in safe handling procedures at the farmer level and even lead farmers (or farmer moderators) were not following basic safety modules.

Particular points noted included;-

- Very low use of protective clothing, even when handling toxic insecticides.

- Re-use of insecticide containers.

- Inadequate attention to proper storage of products and use of household utensils at cattle crushes during spraying.

- Equipment was not always properly maintained.

- Probable lack of attention to wind direction when working.

- Whilst operations at cattle crushes where some training had taken place were relatively well ordered and ethical products used, there was major concern (N.B. Busia) about the activities of 'briefcase' operators selling unreliable services and products.

- Stockists, particularly in rural areas, were more interested in selling 'what they had' rather than serving the farming community. There were mentions at all locations of the use of untrained staff at the rural level.

- Stockists were not selling protective clothing at most locations and much of the application equipment available was of medium / poor quality aimed at servicing the 'bottom end' of the market. The smallholder farmers not attached to cattle crush community groups were always short of cash to purchase quality application equipment and product. In these situations they were vulnerable to cheating sales representatives.

- Stockists were not active enough in demanding small pack sizes from manufacturers / distributors. Subsequently there was still much repacking of product. Worst place seemed to be in the Kagera region.

Environmental Impact of current methods of Tsetse fly control

When one looks back at previous attempts to control Trypanasomiasis and tsetse flies one sees a series of measures that are basically no longer acceptable in environmental terms.

As examples:-

- Aerial application over large areas of Tsetse habitat with insecticides such as malathion

- Thermal fogging of fly habitats

- Removal of large areas of scrub thickets that flies inhabit.

- Culling of alternate hosts to the flies whilst treating livestock

- Preventive injections and curative treatments are not particularly effective.

As a consequence, trapping and routine spraying of insecticides have become the norm for reducing incidence of both flies and diseases.

Routine spraying of livestock with highly active insecticides have little adverse environmental impact and do not cause damage to the habitats of wild animals and other insect life.

Current treatments being promoted are thus about as environmentally friendly as is possible.

Possible limitations to regular livestock spraying programmes can be listed as :-

- Resistance development of flies / ticks etc to currently used insecticides / acaricides.

- Complacency at the farmer level when he is seen as regularly spraying livestock in situations where pest infestation levels have been drastically reduced.

Recommendations

The FITCA / EMMC project clearly made major progress in Busia, Jinja and Kagera regions at reducing Tsetse fly populations and both human and livestock diseases levels. The programmes and help given to the local smallholder farmers have been greatly appreciated in these areas.

However gaps remain at the farmer level regarding the safe use of the insecticides that are currently being used.

We make recommendations as follows:-

1] That work continues in all regions visited – either via FITCA or Government Extensionists to ensure the sustainability of current practices and ensure that products are used much more carefully than at present.

There was much evidence that this status had not yet been achieved although most cattle crush community groups were well on the way.

2] That safe use of products training be intensified in all regions to help ensure that poisoning incidents are avoided. This recommendation would

apply very particularly to the Kagera region where there is a great deal of unsafe use of chlorfenpho (Steladone).

3] Cattle crush application specialists should all wear full protective clothing – two sets are needed at crush sites (one for the stirrup pump operator, one for the sprayman). This PPE to be used regularly, washed after use etc, and not be either brought out for special occasions or shared out as a gift to cattle crush management. (stronger advice from FITCA staff needed)

4] That the other 'standard' safe use messages on storage, disposal, use of utensils, not to purchase repacked product, safe mixing and application methods are used etc be transferred to the farmers in local language and implementation rates assessed.

5] That stockists be trained, particularly in the rural areas to give ethical advice to the farmers, many of whom are not adequately educated to understand correct dosages, dangers of mixing products and even which product should be used to handle their particular problems.

6] That larger stockists in the towns should be encouraged to stock items of protective clothing, and that they should also stock better quality application equipment. It is understood and appreciated that this market is slow moving and not very profitable at this stage and that these stockists are businessmen that have to make a living.

7] That both stockists and farmers should be educated further to only purchase insecticides (also veterinary products) from reliable suppliers that are known to them and will not run away should any problem with product use arise. This problem was most evident in Busia.

8] In both Busia and Kagera the farmer participants were significantly weaker than the others. The benefits of having them mixing with and meeting veterinarians, extensionists and stockists needs to be weighted against their need for training at a different level and their weaker language flexibility. On balance we feel that their interaction at this level with other peer groups just about merits their continued inclusion as participants. Back-up training in the villages, in local language would consolidate the benefits as these leader farmers are well respected, will take notice of technical messages and will persuade others to follow.

(After discussions it was felt that the language issue was <u>not</u> the key reason for weaker performance). Recommendation would thus be to continue with mixed groups at lead trainer sessions.

9] Stockists need to supply farmers with more small pack products. It is recommended that they and the Ministry put pressure on suppliers to properly service the needs of the farmers. Repacking must be avoided.

10] It is recommended that efforts continue (N.B. in Kagera) to create more community self-help projects. This, if properly led, could help farmer groups purchase better quality application equipment, protective clothing and reliable products.

11] Farmers should be given special training in the areas of when they should 'handle' livestock following insecticide / acaricide treatments. (i.e. not to handle for at least six hours after treatment or when the hide is dry). Special attention to be given to the udder and teats prior to milking.

Also – the interval between treatment and slaughter needs to be observed. Manufacturers advice to be followed. This interval is normally 3 days or more.

Specific Recommendations for future training work

(i) Our experience in the field indicated that there was a need (urgent in the case of the Bukoba region) for extensive smallholder farmer training in the Safe Use of Insecticides area.

(ii) We would strongly recommend that further training be given also to stockists, particularly the smaller units servicing the rural villages.

(iii) We would recommend that these trainings be carried out by:-

- Extensionists in FITCA / Ministry
- Leading main suppliers in the towns
- If possible, technicians from companies such as Syngenta, Bayer and Coopers.

Trainings for farmers should not last more than five hours due to concentration problems.

Trainings at this level must be in local language (not English).

Farmers trainings should not start before 10.00 a.m. in order to give them time to complete their daily jobs.
Trainings of smallholder farmers should, whenever possible, be held in their locality (cattle crush, village center, under trees etc). numbers should be kept, if possible, in the 15-40 pax range.

Trainings of stockists should be held in a cheap location as near as possible to their villages. Numbers should not exceed 25 and courses should last at least one full day.

Training costs for farmers should not exceed US$ 150-200 per day, to include a visit to set up the programme, two trainers to run the course.

Training costs for stockists should not exceed US$ 400, to include items as above.

If wished – we could run and supervise an initial training at this level using staff that we have already trained.

Attachments

1] Terms of reference for short term consultancy.

2] Copy of 'examination' questions set for participants. (all venues).

3] Copy of the course evaluation completed by participants (all venues – completed data supplied to Dr. Bernard Toutain).

4] Crush group committee report from Jinja.

5] Copy of Dr. Musokes presentation to the group in Bukoba.

6] Toxicity of insecticides commonly used in treating livestock

Other recommended reading

1. Guidelines for the safe and effective use of crop protection products
2. Guidelines for emergency measures in cases of crop protection product poisoning.

Both published by:-

Global Crop Protection Federation (GCPF)
Avenue Louise 143
1050 Brussels, BELGIUM
Tel; 32 2 542 04 10 Fax; 32 2 542 04 19
croplife@croplife.org www.croplife.org

at a price of approximately US$ 4.00 each. These booklets are currently being revised and will be republished shortly under the CropLife International name.

FITCA-EMMC

TERMS OF REFERENCE FOR SHORT TERM CONSULTANCY

Training in safe handling, use and disposal of insecticides for tsetse control

1. Background of the programme

Human and animal trypanosomosis transmitted by tsetse flies present important constraints on human health and livestock productivity in Kenya, Uganda, Tanzania, Rwanda and Ethiopia.

The FITCA programme has been implemented to improve the livelihood of the rural population and reduce poverty by helping farmers to control tsetse fly, to increase livestock productivity and to enhance agricultural production by improving their agricultural system.

The European Union finances the FITCA program with regional and national indicative funds under the EDF VII, agreement #5682/reg. The Regional Tsetse Co-ordination Unit based at AU/IBAR offices supervises the FITCA National programmes.

Funded by the EU, the Environmental Monitoring and Management Component (EMMC) is part of the regional FITCA program. EMMC is contracted to ILRI (TAC signed on March 28th 2001 for 2 years, extended until December 2003, and new TAC signed on February 28th 2004 until December 2004). EMMC is supporting FITCA National Programmes in terms of assisting with the formulation of plans to reduce the likelihood of impacts of the tsetse control techniques applied.

2. Background of the consultancy

Tsetse infestation is for a long time considered as a major threat for human and livestock; important national programmes were implemented in the aim to control the fly transmitted diseases and allow rural populations to access new arable lands.

The recent specific considerations of the environmental issues, the threats on the natural resources in many places of the world and the necessity to develop a sustainable agriculture in consideration to future generations have lead the supporters of the new tsetse control project FITCA to have a special attention to the environment and to include a specific component on this field.

Controlling tsetse has several environmental impacts, separated into two distinct types: direct and indirect. Most of the former tsetse control programmes had direct impacts on natural resources. As a result of the vector control, people are likely to settle in newly cleared lands after they are freed of the tsetse fly. The indirect impacts on the environment are the effects through the settlement of human populations on wild areas, the expansion of livestock populations, and land-use change.

3. Objective of the Consultancy

The TOR of the EMMC mentions that a Short Term Consultant specialised in the use of insecticides will be mobilised to develop guidelines and training for the safe use and disposal of insecticides for tsetse control. This STC is referring to the activity 2.3 of the logical framework for FITCA-EMMC.

The objective of this present consultancy is to collect information on the practices of insecticides used to control tsetse in the FITCA areas and then delivering knowledge on the best practices on handling, using and disposing the insecticides for the safety of humans, of animals and protection of environment.

4. Methodology

In a first stage, the consultant will meet the FITCA staff in each national area in charge of the tsetse control using insecticides. He/she will be informed on the methodologies used. He will do a critical analysis of the practices, as well as the misuses that can be observed.

In a second stage, one workshop targeting about twenty trainees will be organised in each country with help of the respective FITCA-national project personnel. These workshops for training will be held in Kenya, Uganda (and if possible in Tanzania). Then, the trainees will become trainers at the community level.

Using the experience gathered during this consultancy, the consultant will write a manual on the safe handling, use and disposal of insecticides for tsetse control in FITCA areas.

5. Expected results

- A critical analysis of the handling of insecticides by the farmers elaborated with the FITCA staff.
- The training of about 10 field staff in each country.
- The production of a practical manual for this field staff, made to help them to train the farmers.

6. Profile of the expert

He/she should be a specialist of the pesticides used in agriculture and their handling and danger, with a good knowledge in ecology and environmental issues.

7. Reporting format and schedule

This consultancy has to be achieved before July 2004. An activity report will be given at the end of the consultancy, in the same time as the manual. The draft version will be submitted to the project coordinator. The coordinator will give his comments not later than two weeks after reception of the draft. The expert will incorporate corrections to produce the final report. The report and manual must be written in English.

Annex

Practical information

1) The consultant can directly contact the coordinator of each FITCA National programme concerned:
   - To get the relevant information on the chemicals used in the tsetse control and the methods of use applied in their region.
   - To initiate the preparation of the workshops: choice of date, place, and selection of participants.
   - FITCA country Projects would assist the consultant to organise the workshop and the logistic.

2) The consultant prepare with ILRI and EMMC:
   - Reservation of transport
   - Payment of an advance for paying the workshop expenditure.
   - Contain of the workshop.

3) The consultant organise the mission:
   - Travel
   - First part of stay to work with FITCA staff for collecting further information.
   - Second part for final organisation of the workshop.
   - Third part dedicated to the workshop itself.
   - Travel back.

4) After all the workshops
   - Writing of an activity report.
   - Writing of a manual on safe handle, use and disposal of insecticides in tsetse control.

Useful addresses:
   - FITCA KENYA : Dr Stephen Orot, project manager P.O.Box 261 Busia, Kenya – fitcapm@yahoo.com or steve.orot@fitca.co.ke
   - FITCA KENYA : Mr Francis Oloo, FITCA Kenya Liaison Officer, AU-IBAR, P.O.Box 30 786 Nairobi – oloofp@africaonline.co.ke
   - FITCA UGANDA ; Dr Ambrose Gidulu, FITCA Uganda coordinator, P.O.Box 2 Entebbe, Uganda – ncp.fitca@utlonline.co.ug
   - FITCA UGANDA : Dr Simon Gould, Technical Assistant, same address – simongould@infocom.co.ug
   - FITCA TANZANIA, area of Tanga : Dr Chesnodi Kulanga, project manager FITCA Tanga – fitca@kaributanga.com
   - FITCA TANZANIA, area of Kagera : Dr Silas Omolo, project manager FITCA Kagera – yaasilahotels@yahoo.com

SAFE USE OF INSECTICIDES TRAINING
FITCA – EMMC – ILRI
JUNE 2004

TRAINING OF TRAINERS

Examination to assess understanding of training modules.

1. Approximately how long has legislation to control pesticides usage been in place in your country?
   Tick one: 20 years 10 years 5 years

2. List three key differences between organochlorine and organophosphate insecticides.

3. List two key differences between organophosphate and pyrethroid insecticides

4. What do you understand by the LD 50 of a chemical

5. List three methods of possible entry of pesticides into the body

6. State two methods of disposal of pesticide wastes

7. How would you dispose of empty plastic pesticide containers?

8. Mention six messages found on all legally registered pesticide containers and explain the importance of each.

9. Which sections of a label should the user read (or have explained to him/her)

10. List five key components of safe and effective use of pesticides in your region

11. What are the key components of an IPM programme?

12. Name the key antidote to be used when organophosphate poisoning is diagnosed

13. Can the same antidote be used if pyrethroid poisoning is suspected?

14. Give a definition of the term pesticide

15. If you had a choice when treating animals against Tsetse fly infestation would you prefer to use a knapsack sprayer or a stirrup pump? If so why?

16. What is the dosage of deltamethrin recommended for Tsetse fly control when spray treating cattle? (Expressed in rate of formulated pesticide product per litre of spray mix)

17. List five items of protective clothing that should be worn when handling pesticides

18. What first aid measures should you take if you or a colleague accidentally gets formulated pesticide in his/her eyes?

19. What do you understand by the term " shelf life" of a chemical?

20. Spray operators should not:-

    a)

    b)

    c)

When spraying – please list above

EVALUATION FORM

Course content

1. Training had a logical sequence.
   ☐ Strongly agree ☐ Agree ☐ Disagree ☐ Strongly disagree

2. Training objectives were clearly stated and explained during the workshop.
   ☐ Strongly agree ☐ Agree ☐ Disagree ☐ Strongly disagree

3. Lectures and assignments were relevant to the training objectives.
   ☐ Strongly agree ☐ Agree ☐ Disagree ☐ Strongly disagree

4. Adequate background information was presented at the beginning of each session.
   ☐ Strongly agree ☐ Agree ☐ Disagree ☐ Strongly disagree

5. The course content was relevant to your day-to-day extension work.
   ☐ Strongly agree ☐ Agree ☐ Disagree ☐ Strongly disagree

6. This training increased your knowledge of the subject matter.
   ☐ Strongly agree ☐ Agree ☐ Disagree ☐ Strongly disagree

7. List subject areas that you would suggest we omit in future courses.

   _____
   _____
   _____

8. List subject areas that you would suggest are included in future courses.

   _____
   _____
   _____

Quality of instruction

Please rate the instructors in terms of their:

9. Presenting the information clearly.
   ☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

10. Interaction with participants.
    ☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

11. Any other comments on the instructors?

    _____
    _____
    _____

Overall

12. List the three best features of this training course in your order of importance:
    1. _____
    2. _____
    3. _____

13. List the three weakest features of this training course in your order of importance:
    1. _____
    2. _____
    3. _____

14. Did the workshop offer adequate opportunities for you to share experiences with other workshop participants?
    ☐ Yes ☐ Fairly adequate ☐ No

15. Was the workshop duration adequate:
    ☐ Yes ☐ Fairly adequate ☐ No

16. Additional comments and/or suggestions that may improve similar training activities in the future.

    _____
    _____
    _____

WORKSHOP ON SAFE USE OF INSECTICIDES

BUSIA, KENYA

EVALUATION REPORT

Introduction

A 2 days workshop on safe use of insecticides was held in Busia, Kenya on the 9th and 10th of June 2004. The consultant was Mr. John Aston, with the assistance of Mrs. Judith Mutea, and the efficient help of Dr. Steve Orot, FITCA project manager in Busia. At the end of this workshop, an evaluation exercise was conducted where attendants participated in answering structured questions designed to assess and highlight the strengths and shortcomings as observed by them. This report reflects on the outcome of that evaluation exercise.

Course content

Training had a logical sequence (Q1) and *the objectives were clearly stated and explained* (Q2) according to the attendants. Similarly, the *lectures and assignments were* deemed *relevant to the training objectives* (Q3). Regarding the presentation of *background information at the beginning of each session* (Q4), majority (>88%) of the attendants were happy, except about 10% of them. In addition, almost everyone agreed to the fact that the *course content was relevant to the extension work* (Q5), and that *the training increased their knowledge of the subject matter* (Q6).

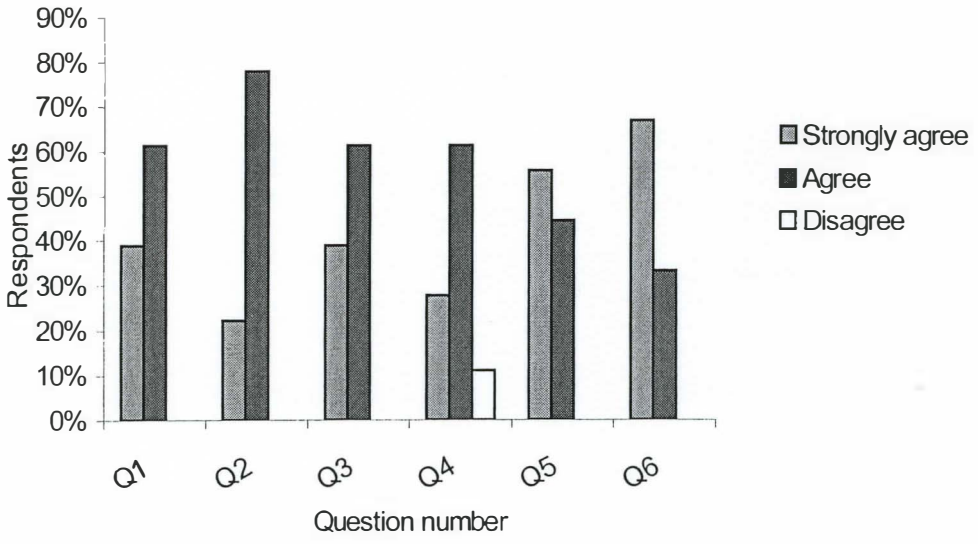


Figure 1 Perception of the participants on the course content and its relevance to the day-to-day extension work in Busia, Kenya.

Nevertheless, a significant number of attendants felt (Q8) that legislation and policy issues relating to the distribution and use of pesticides needs to be included in the course content, while a number advocated for additional knowledge acquired through practical work and case studies of common pests and diseases including their control; correct identification of pesticides and proper application procedures, including the quantity, the timing and spraying skills; the chemistry of the insecticides, including how they react to other substances and their potential danger to human and environmental health; and the maintenance and servicing of sprayers and their parts. Additional request includes training on agriculture, horticulture and poultry keeping. One participant in Busia felt that formulation and mode of action of pesticides should be omitted in future (Q7) because 'it did not come out clearly'.

Quality of instruction

The *clarity of presentation* (Q9) and the *interaction of instructors with the participants* (Q10) were conducted much more poorly compared to the previous course content section, where a significant number of people felt it was just 'good'. Although slightly more than 60% accepted that the presentation was clear, more than 30% were not satisfied, and felt that a lot more could have been done to improve it. Similarly, over 40% of participants were unhappy in the way the instructors interacted with them. For this reason, the training could be of greater impact if enough attention was given to improve the level and the extent of interaction during the workshop.

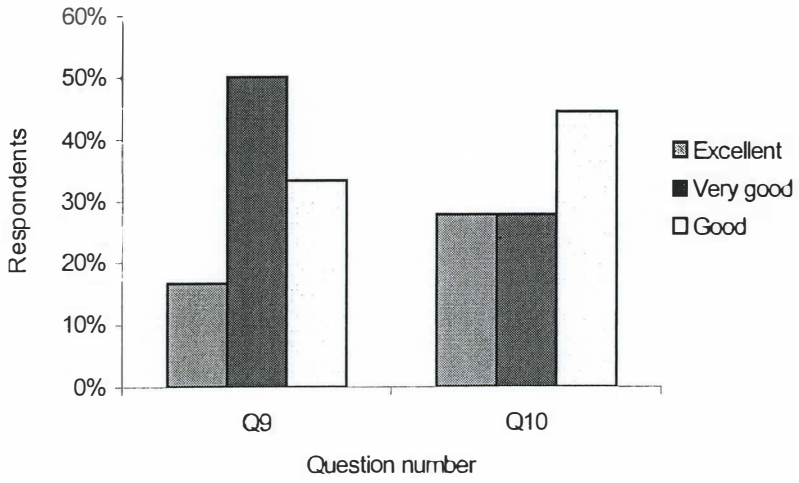


Figure 2 Perceptions of the participants on the quality of instruction, their interaction with instructors and other participants in Busia, Kenya.

Other *comments concerning the instructors* (Q11) include:

1) Group work enhanced participatory approach in presentations,
2) Very relevant, informative and to the point,
3) Knowledgeable, friendly and open,
4) More time is needed and the training could be extended to farmers in other areas,

5) Some instructors digressed leading to poor time management.

Overall

Considerable number of participants (>90%) were contented that the *workshop offered adequate opportunities to share experiences with other attendants* (Q14). Only one person disagreed. On the other hand, *the duration of the workshop* (Q15) was highly contentious, where majority of people thought it was inadequate. As little as 25% did not mind the duration. The displeasure concerning the workshop period is a strong indication that although other sections of the training were implemented commendably, the pertinent concerns raised could jeopardize the effective on - farm - impacts that are targeted to come out of the training.

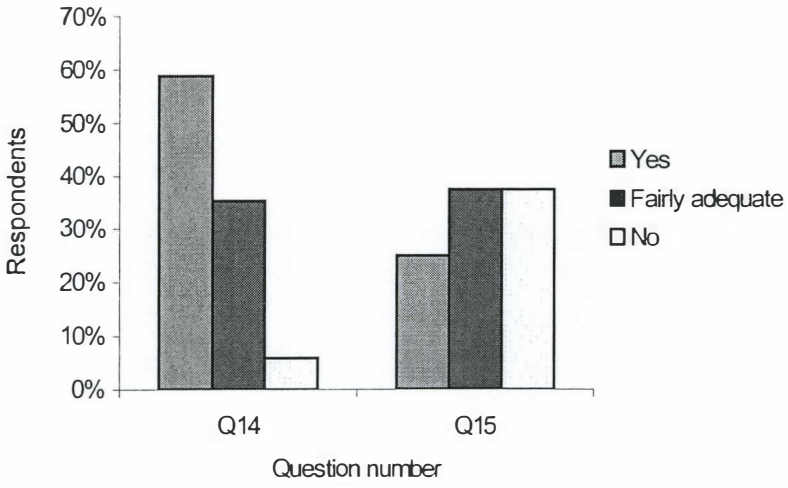


Figure 3 Participants' evaluation on the sharing experiences and on whether the duration of the Kenya workshop was adequate

The *best features of this course* (Q12) according to the participants includes:

1) Logical sequence of topics and presentation,
2) The course content like classification formulation and mode of action of pesticides; pesticide label, toxicity and colour codes; protective clothing; first aid measures; safe application/spraying; safe environmentally friendly disposal; effects to the environment,
3) Group work and discussions,
4) Use of teaching aid materials including video, demonstrations and lectures,
5) Promoting the farmers income by increasing the number of livestock in the area,
6) Short sessions with simple informative messages which is creating awareness and responsibility,
7) Interaction with other trainees in a conducive training environment.

Some of the *weakest features of this training course* (Q13) include:

1) The duration allocation to the training was very short,
2) Trainees were not accommodated together to enhance interaction,
3) Time management was poor,
4) Diversity of stakeholders was very limited,

5) No handed out literatures.

Conclusion

The participants were happy with the training and many have requested FITCA to conduct them more often. A good number suggest that training be held at least three times a year for a duration that is not less than five days. Others request that training materials be increased since they were not enough. Another request is that the training is expanded to cover more districts, in order to reach more farmers, extension workers and stakeholders.

WORKSHOP ON SAFE USE OF INSECTICIDES

JINJA, UGANDA

EVALUATION REPORT

Introduction

A 2 days workshop on safe use of insecticides was held in Jinja, Uganda on the 16th to the 17th of June 2004. Dr Ambrose Gidudu, FITCA project manager in Uganda, aided the consultant Mr John Aston in performing this task. At the end of this workshop, an evaluation exercise was conducted where attendants participated in answering structured questions designed to assess and highlight the strengths and shortcomings as observed by them. This report reflects on the outcome of that evaluation exercise.

Course content

Majority of the participants of this workshop supported the training, indicating that it significantly improved their understanding on the way they handle insecticides in their daily farming activities. This implies that considerable benefit may be realised as the knowledge acquired during this training is translated into effective use and management of on farm chemicals.

Accordingly, more than 30% strongly agreed, while over 60% felt that the *training had a logical sequence* (Q1), with only one participant expressing reservation over the same. Unlike the evaluation in Tanzania, none of the attendant in Uganda objected to any of the questions between Q2 and Q6. All of them either strongly agreed or just agreed to the evaluation questions indicating that they strongly supported the training exercise.

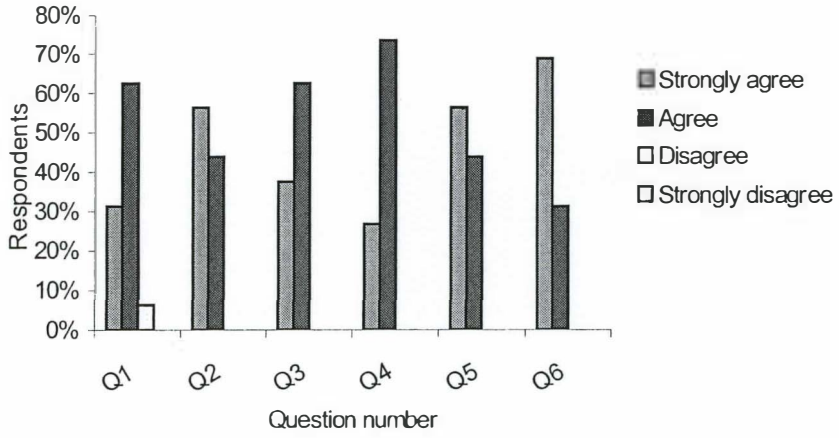


Figure 1 Perception of the participants on the course content, its logical sequence and clarity of presentation and its relevance to the day-to day extension work in Uganda.

In addition, the following was suggested for future workshops (Q8) in order to further improve them;

1) Training to cover integrated pest management (IPM); industrial chemical manufacturing; and radioactive materials.
2) Regulate pesticide waste disposal locally and internationally
3) Field visit.
4) Follow up seminars
5) Enough demonstration materials for each participant and use of posters
6) Classification and mode of action of pesticides
7) Detailed community training concept
8) Herbicides

Nevertheless there were suggestions that some areas be dropped in future workshops (Q7) as follows;

1) Examination should be dropped
2) Demonstrations on use of pump

Quality of instruction

The *information was presented clearly* (Q9) according to over 60% of respondents, while about 25% rated the presentation as excellent. As many as 50% of participants felt that their *interaction with the instructors* (Q10) was very good while about 30% rated it as excellent. However, about 10% and 15% of attendants were concerned about the *presentation of information* and the *interaction with the instructors* respectively, which they considered as just good. Although no one considered the quality of instruction as 'fair' or 'poor', it is imperative that these aspects of training are improved, particularly because they are critical determinants of the level of communication between the parties.

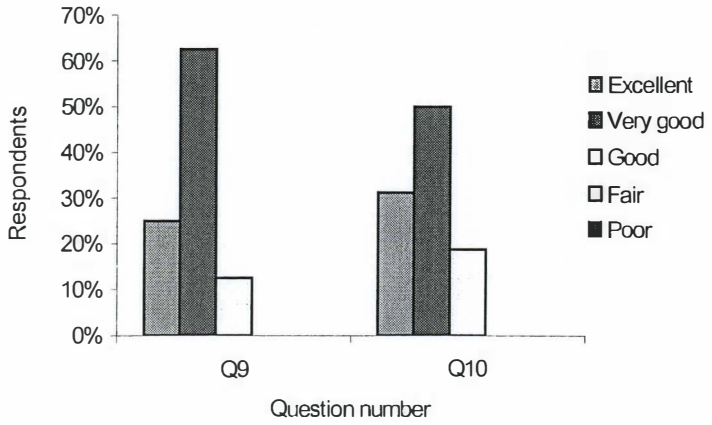


Figure 2 Perceptions of the participants on the quality of instruction, their interaction with instructors and other participants in Uganda.

Other remarks touching on the instructors include;

1) Insufficient time to interact with the instructors,
2) Instructors were friendly, approachable and readily gave guidance,
4) Too academic and technical,
5) Poor time management,
6) Organised and straight forward,
7) Well qualified in the area of safe pesticide use,
9) More instructors required in order to avoid one person handling almost everything,
10) Improve on visual demonstration

Overall evaluation

The *workshop offered adequate opportunities to share experiences with other workshop attendants* (Q14) according to more than 60% of the respondents while more than 40% felt that it was fairly adequate. This implies that all the attendants were satisfied and recognised the opportunity that the workshop presented for sharing and exchanging experiences and ideas. Similarly, more than 70% were satisfied with *the duration of the workshop* (Q15). A good number of them felt it was fairly adequate. Nevertheless, one individual was unhappy with the duration, which according to him/her was too short.

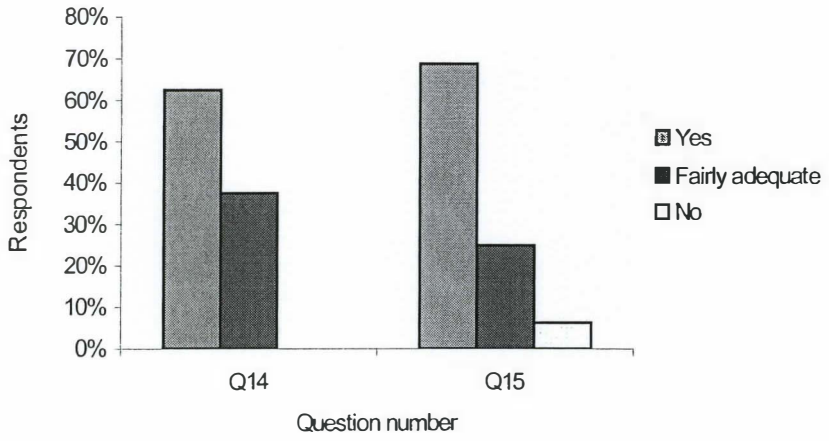


Figure 3 Participants' evaluation on the sharing experiences and on whether the duration of the Uganda workshop was adequate

Some of the best *features of this training workshop* (Q12) include;

1) Course presentation was clear, informative and simple,
2) Information given was applicable,
3) The tools used to demonstrate were familiar,
4) It was participatory,
5) Facilitation and location were good,
6) Examination was good to test understanding,
7) Good training and interaction skills from instructors,
8) Course content was wide,
9) Discussions were stimulating,

10) Organisation and time management was wonderful,
11) The learning was an excellent opportunity.

Some areas that were considered weak (Q13) include;

1) Two days was too short time.
2) Too much theory and no field work to see what farmers do.
3) Insufficient posters and hand outs.
4) Some participants were not accommodated.
5) Lack of information about regulatory authorities in the country.
6) The exam was too hard.

Conclusion

Most of the participants were happy with the training and requested FITCA to conduct it more frequently so as to increase the level of awareness in pesticide handling. In addition the following was suggested;

1) Residential training would facilitate closer level of interaction,
2) More video shows, posters and workshop handouts be included,
3) Field trip would have been more beneficial,
4) Shorten the course to one day,
5) Need to have other technical professionals like medical,
6) Always inform the participants well in advance by sending workshop programme. This will give them adequate time to prepare,
7) You can suggest a test, but do not actually let the participants go through it. If it has to be there, then let it be very straight forward,
8) Decongest the course,
9) Extend the training to the district level,
10) Increase the number of trainees.

WORKSHOP ON SAFE USE OF INSECTICIDES

BUKOBA, TANZANIA

EVALUATION REPORT

Introduction

A 2 days workshop on safe use of insecticides was held in Bukoba, Kagera region, Tanzania on the 30th of June and 1st of July 2004. The consultant was Mr John Aston with the assistance of Dr Silas Omolo, FITCA project manager in Kagera. At the end of this workshop, an evaluation exercise was conducted where attendants participated in answering structured questions designed to assess and highlight the strengths and shortcomings as observed by them. This report reflects on the outcome of that evaluation exercise.

Course content

In general, the workshop received an overwhelming support from the attendants, most of them citing significant improvement in their perception and increased awareness on the subject and topics that were covered in the workshop which have direct application in their day-to-day activities.

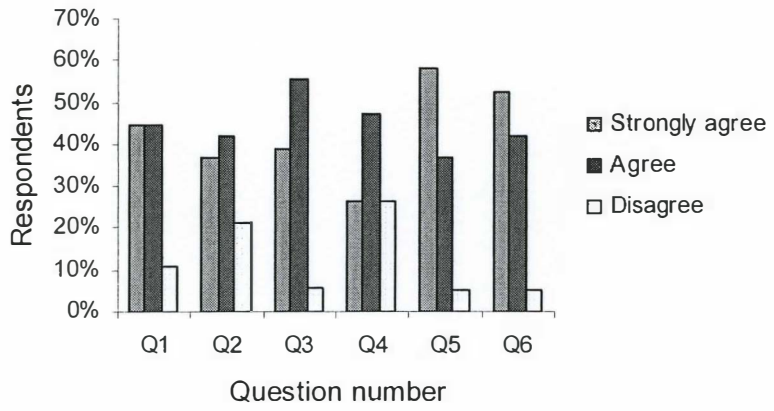


Figure 1 Perception of the participants on the course content and its relevance to day-to day extension work

On average, majority of workshop attendants agreed that *the course content had a logical sequence* (Q1) and that *training objectives were clearly stated and explained* (Q2). However, 2 individuals were dissatisfied with the logical sequence while about 4 felt that training objectives were not clearly stated and explained. Although absolute agreement may not have been objectively expected in view of diverse background experiences from which the attendants were drawn, the objecting few nevertheless provide some impetus

on the need to improve future workshops in order to maximise on the course delivery system, thereby enhancing its application and impacts on the ground.

About 50% were in agreement and more than 40% strongly felt that *the lectures and assignments were relevant to the training objectives* (Q3) and that *the course content was relevant to-day-to day extension work* (Q5). Only one attendant felt otherwise, and this is perhaps some of the key areas that the workshop scored highly according to the respondents. In addition, majority of respondents (>50%) were in agreement that the training increased their knowledge in the subject matter (Q6).

Nevertheless, it was generally felt by a good number of attendants that *adequate background information* was not *presented at the beginning of each session* (Q4), implying that sufficient time may have been needed to introduce the subject where enough background information covering the course content is delivered to the attendants.

Overall, the evaluation on the course content section of this workshop (Q1 to 6) indicates a high score rating of 88%. However, the participants suggested (Q7 and 8) that the following areas be strengthened in future:

a) Procurement, handling and storage of pesticides,
b) Emergency measures,
c) Classification formulation and mode of action of pesticides,
d) Kiswahili language to be use for all to understand,
e) Practical demonstrations using animals in the field,
f) More emphasis on tick borne diseases and helminthes,
g) Environmental impact in broader view.

Nevertheless a section of the participants felt that the topic on classification, formulation and mode of action of pesticides was not necessary when you are dealing directly with farmers.

Quality of instruction

More than 35% of the attendants felt that *the instructors clearly presented the information* (Q9) *and interacted excellently with participants* (Q10). To them, the instructors rating ranged from very good to excellent. However, less than 15% of the participants were not as enthusiastic, and felt that the instructors ranged from good to fair. Much of dissatisfaction in this group concerned the manner in which the information was presented, whereas, as many as 10% felt it was fairly unclear. Only fewer than 5% were concerned with the manner and the extent to which the instructors interacted with the participants, implying that the level of interaction was satisfactory to many.

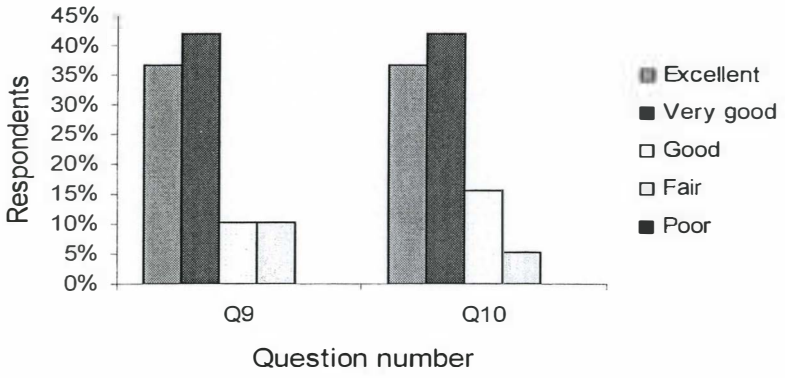


Figure 2 Perception of the participants on the clarity of presentations and interaction with other participants

Overall evaluation of the workshop

Over 50% of participants were satisfied that *the workshop offered adequate opportunities to share experiences with other workshop attendants* (Q14), and that *the workshop duration was adequate* (Q15). Despite this, about 10% were not happy with the two days allocated for the workshop, suggesting that the number of days need to be increased slightly to allow for a more comprehensive training.

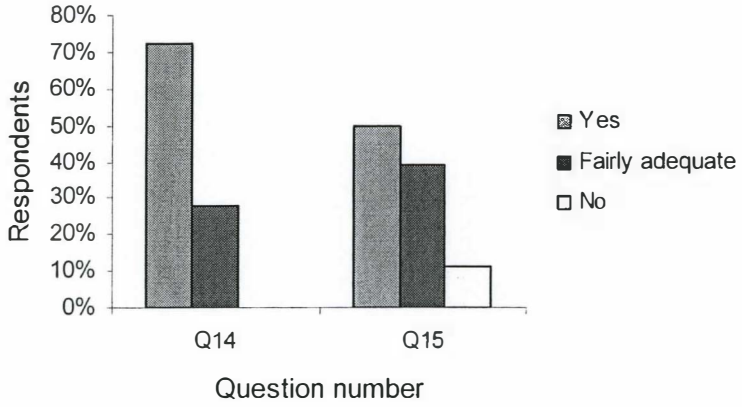


Figure 3 Evaluation by participants on sharing experiences with other participants and on whether the duration of the workshop was adequate

Additional strengths (Q12) that were cited by the participants include:

a) Entertaining teaching methodologies where timetable was strictly followed.
b) The site of the course was very nice

c) Course contents like pesticide handling, label, toxicity, colour codes, protective clothes and their maintenance; environmental concern; animal diseases; purchase, transport and storage of insecticides were very informative.
d) Group discussions and practical demonstrations were stimulating experience.
e) First aid training was invaluable.

However, about 10% of participants were not as enthusiastic (Q13). One of the major reasons cited for dissatisfaction was the use of English language, which, according to the participants, is not commonly used and just a few understand it well. Other shortcomings cited include:

a) Classification, formulation and mode of action of pesticides were not covered sufficiently.
b) No handouts and posters were distributed to the participants for reference.
c) Best practices in spraying procedures were not adequately tackled. The timetable and the lesions were long.

Conclusion

Most of participants were happy and request FITCA to conduct training more frequently (if possible every 3 months) and also increase the number of days for training to at least 5 days (Q16). During such training, Kiswahili language is recommended by many to be used as the formal training language. Other requests include:

a) Training to be conducted at the farm level and on the farm,
b) Incorporate field trips so as farmers can see what is practically happening in the farms,
c) Make many poster and handouts,
d) Increase the number of women participants.

BUKOBA DISTRICT COUNCIL

SAFE USE OF INSECTICIDES

TRAINING OF TRAINERS COURSE FOR LIVESTOCK OFFICERS AND COMMUNITY LEADERS IN TSETSE FLY INFESTED AREAS IN BUKOBA DISTRICT 30/6/2004

TOPIC: Introduction to Pests and Diseases of Livestock.

PRESENTER: Dr. K.F. Musoke
District Veterinary Officer
Bukoba District

1. **What is a PEST**
   A Pest can simply be defined as an external parasite. A parasite is an organism which live on another organism (the host). It can be an animal or a plant. A Parasite can be ectoparasite or endoparasite. A pest is always troublesome, annoying and destructive. Some of the commonly known livestock pests are Fleas, Lice, Ticks, Mites and flies.

2. **What is a diseases**.
   The body is said to be diseased when its physiology, mental, morphology or/and functional states is/are abnormal.

3. **What are the Effects of Pests to Livestock**
   Pests cause direct or indirect damages to their host (Livestock). Both the direct damages and indirect damages done to Livestock finally end into diseases. Some direct damages done by pests to Livestock include;
   (i) Exsanguinations (feeding on blood): This leads to anemia.
   (ii) Biting worry: This cause the animal to reduce its feeding rate resulting into loss of body weight, general body weakness and reduced production and reproduction.
   (iii) Myasis (inversion of the living animal body by larvae of pest e.g. true flies. This may lead to animal death.
   (iv) Skin deformity.
   (v) Lameness e.t.c.

- Indirect damage is related to transmission of toxins and disease causing agents to Livestock.

Some of the Livestock diseases and their corresponding Livestock pest are:

	PEST	DIRECT EFFECT	INDIRECT EFFECT (Disease transmission)
1.	Ticks	- Anemia - Irritation - Lameness - Loss of function of teats - Skin deformity - Mastitis - Foot rot in sheep - Loss of production - Loss of reproduction	- Theileriousis - Babesiosi - Anaplasmosis - Tick toxicosis - Nairobi Sheep disease - Canine ehrlichiosis - Heart water e.t.c.
2.	Mites (mange)	- Painful biting - Itching - Loss of hair - Hyperkeratosis - Irritation - Reduced growth rate e.t.c.	- African swine fever (Onirthodorus moubata) - Fowl Pox (O. bursa) e.t.c.
3.	Flies	- Allergic dermatitis of sheep - Damage to hide - Annoyance - Irritation - Stampeding (animal running) - Anemia etc.	- Blue tongue of sheep (Culicoides) - African horse sickness - Dirofilaria immitis of dogs (mosquito) - Equine Infection anemia - Rift valley fever - Liver blindness (onchocercosis) - **Trypanosomiasis**
4.	Fleas	- Inflammation - Irritation - Annoyance - Pruritis - Itching - Blindness in birds - Obstrucition of mammary teats in saws. - Secondary infections. (tetanus) - Tungosis	- Dipylidium caninum (dog worm) - Listeriosis of cattle - Brucellosis e.t.c
5.	Lice	- Restless - Irritation	- African swine fever (Haematopinus suis)

		- Loss of production - Injury (wounds) - GIT hair balls - Lameness - Anemia - Susceptibility to other diseases - Serious fetal	- Dipylidum caninum (dog worm)

CONCLUSION:

Generally all Livestock pests cause:-

- Reduced Livestock productivity.
- Reduced Livestock reproduction.
- Increase cost of animal husbandry management to farmer.
- Reduced Livestock population.
- Thus cause loss to farmer.

BUGONDHA PARISH,
15th JULY, 2004.

PARISH REPORT.

BACK GROUND:

Sensitisation and activities of FITCA started in Bughondha parish in 2002. Bugondha parish constituted by four zones (L.C.I'S) namely Bugobi, Butaaga, Bususwa and Bukwanga.

The residents keep cattle, ~~keesin~~ poultry, pigs, goats and also do Agriculture on the crop husbandry side.

On the side of cattle keeping, people accepted to work together in collaboration with Mr. Isabirye and Mr. Ugobi as experienced veteneny staff and a committee was put in place as follows:

1. Mr. Kirunda Wilberforce ..... Chairperson.
2. Mr. Bagoole Kyabita ..... Vice chairperson.
3. Mrs. Nakiyuka Monica. ..... Treasurer.
4. Mr. Boyi Samwiri ..... Gen/secretary.
5. Mr. Gumugobye Samuel. ..... Member.
6. Mr. Bakabla George. ..... Member.
7. Mr. Wakabala Ronard ..... Member.
8. Mr. Kasozi Andrew. ..... Member.

BENEFITS: The residents of Bugondha parish express their appreciation in achieving the following from FITCA activities:-

- The attainment of a spray pump which was received on 12th April, 2003.
- We acquired 1 litre of Decatix.
- The committee was trained on mixeing ratios of chemical to water. i.e 20ml per 20 litres of water/jerrycan.
- The committee further obtained an overall, hat, mouth piece, gumboots for use during spraying.

In 2002 we recieved:

- Free treatment against Nagana, by use of trypancidal & pour-on.
- There was screening of blood in h

- There was screening of blood in human and animals.
- Provision of traps for Tsetse flies.

PROBLEMS.
.....

- The price of 1litre of Decatix costing sh. 90,000/= is high for the farmers to maintain the monthly basis of spraying.
- The water for mixing the chemicals got from a far distance.
- Tsetse flies are still in existance though reduced proportionately.
- Lack of abull for crossing our animals in the parish.
- Also we failed to open up Bank Account due to hard procedures.

APPLICATIONS FOR CONSIDERATIONS.
.....

Our appeal to the PITCA management include considerations in the following:

- Periodic provision of Delatix or some considerable cost sharing.
- Introduction of bull scheme at parish level to enable people easily cross their animals.
- Due to long distance for water, we request for consideration for a bore hole.
- Provision and initiation of oxen plough in this parish.
- Improved seeds to boost crop husbandry.
- Sell to us wires for fencing at subsidesed prices.
- We still apply for more traps.

In conclusion we thank the local council authorities at all levels, the Veterinary officers/assistants and the PITCA management for considering our parish. The animals are now health and controlled against ticks and tsetse flies.

We appeal for more support.

Reported by: ..Kirunda Wilberforce..
KIRUNDA WILBERFORCE.
CHAIRPERSON.

Toxicity of insecticides commonly used in treating livestock

1] Deltamethrin.

The product is used in low dosages and in a highly dilute form (1 c.c. of 5% formulation per litre of water).

It is unlikely that any adverse incidents will be recorded when this product is used (particularly if protective clothing is worn properly). A possible exception would be that one or two careless operators could suffer minor short term skin irritation.

2] Amitraz

Amitraz has low toxicity to humans and most livestock (possible exceptions are dogs and donkeys). It has been used safely and effectively for many years now.

3] Chlorfenvinphos

This product is very toxic and is used frequently (every 3 days?). It is used extensively in Western Tanzania and careless use can easily cause serious poisoning incidents. (and probably has).

Data on the properties of these groups / compounds attached.

Suggested visual aid: None indicated.

THE MAIN TARGET OF ORGANOPHOSPHORUS COMPOUNDS IN THE BODY IS THE ENZYME CHOLINESTERASE. THIS ENZYME IS ESSENTIAL FOR THE PASSAGE OF NERVE IMPULSES BETWEEN CELLS.

ORGANOPHOSPHORUS COMPOUNDS ARE NOT STORED IN THE BODY FOR LONG PERIODS, BUT THEIR EFFECTS CAN ACCUMULATE OVER A PERIOD OF WEEKS.

Examples with hazard class of technical product:

pathion (la)	diazinon (II)	malathion (III)
dichlorvos (Ib)	fenitrothion (II)	chlorpyriphos methyl (III)
fenthion (Ib)	bromophos (III)	temephos (Table 5)

Subsidiary points:

1. The degree of inhibition of red cell or whole blood cholinesterase indicates the possibility of the onset of symptoms and the outcome. Ignition of plasma cholinesterase is only an indication of exposure to an inhibitor.

2. Inhibition of the enzyme may be fully reversible, partially reversible, or irreversible. The rate and degree of spontaneous reactivation depends on the nature of the compound.

3. Reactivation of red cell or whole blood cholinesterase is usually slow without treatment, and therefore the effects of small exposures resulting in a degree of inhibition can accumulate until symptoms can occur after a relatively minor exposure.

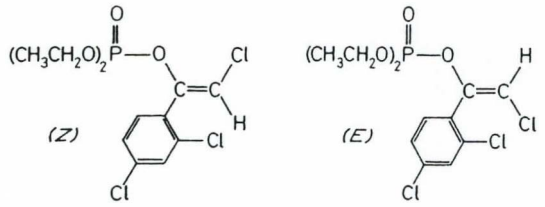
For discussion:

What are the common or approved and trade names of the chemicals most commonly used by the group?

Other information:

1. In this and the following modules, only a selection of pesticides can be given, and these should be modified to accord with local use.

$C_{12}H_{14}Cl_3O_4P$(359.6)
GR CG DYU1GOPO&O2&O2



Nomenclature and development.

Common name chlorfenvinphos (BSI, E-ISO, (*m*) F-ISO, BPC); CVP (JMAF); *exception* (USA). Chemical name (IUPAC) 2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate (I). (*C.A.*) 2-chloro-1-(2,4-dichlorophenyl)ethenyl diethyl phosphate (9CI); (I) (8CI); Reg. No. *[470-90-6]* (formerly *[2701-86-2]*) (*Z*- + *E*)-isomers; *[18708-87-7]* (*Z*)-isomer; *[18708-86-6]* (*E*)-isomer. OMS 1328; ENT 24 969. Its insecticidal properties were described by W. F. Chamberlain *et al.* (*J. Econ. Entomol.*, 1962, **55**, 86). Introduced by the Shell International Chemical Company Ltd, Ciba AG (now Ciba-Geigy AG) and by Allied Chemical Corp. (who no longer produce or market it) (USP 2 956 075; 3 116 201 - Shell) as code no. 'SD 7859' (Shell), 'C 8949' (Ciba-Geigy), 'GC 4072' (Allied); trade mark 'Birlane' (for crop protection use), 'Supona' (for veterinary use) (both to Shell), 'Sapecron' (Ciba-Geigy), 'Apachlor' (KenoGard AT VT).

Properties.

Produced by the reaction of triethyl phosphite with 2,2,2',4'-tetrachloroacetophenone, the technical material (⩾90% (*Z*)- and (*E*)-isomers, typical ratio (*Z*:*E*) 8.4:1) is an amber-coloured liquid, with a mild odour; m.p. −19 to −23 °C; b.p. 167-170 °C/ 0.5 mmHg; v.p. (for pure compound) 0.53 mPa (extrapolated to 20 °C); n_D^{20}1.5281 (*Z*)-, 1.4210 (*E*)-isomer; density 1.36 g/cu. cm (20 °C). Solubility (23 °C): 145 mg/l water; fully miscible with acetone, dichloromethane, ethanol, hexane, kerosene, propylene glycol, xylene. Slowly hydrolysed by water or acid, 50% decomposition occurs at 38 °C in >700 h at pH1.1, >400 h at pH9.1, but unstable in alkali - 50% loss at 20 °C occurs in 1.28 h at pH13. It may corrode brass, iron and steel on prolonged contact and EC formulations are corrosive to tin plate.

Uses.

Chlorfenvinphos may be used either as a soil insecticide for the control of cutworms, root flies and root worms at 2-4 kg a.i./ha or as a foliar insecticide to control *Leptinotarsa decemlineata* on potato, scale insects on citrus at 200-400 g/ha where it also exhibits ovicidal activity against mite eggs, and of stem borers on maize, rice and sugarcane at 550-2200 g/ha. It controls whiteflies (*Bemisia* spp.) on cotton at 400-750 g/ha but whitefly parasites are not affected. It also controls ectoparasites (*Dalmania bovis*, *Bovicola bovis* and *Haematopinus quadripertusus*) of cattle at 0.3-0.7 g/l, and *Lucilia sericata* and *Ixodes ricinus* of sheep at 0.5 g/l and *D. ovis*, *Melphagus ovinus* and *Linognathus ovillus* at 0.1 g/l. Chlorfenvinphos may also be used in public health programmes especially against mosquito larvae. The metabolism and breakdown are reviewed by K. I. Beynon *et al.* (*Residue Rev.*, 1973, **47**, 55).

Toxicology.

Acute oral LD_{50}: for rats 9.7-39.0 mg tech./kg; for dogs >12 000 mg/kg; for pigeons 16 mg/kg; for pheasants 107 mg/kg. Acute percutaneous LD_{50}depends on carrier and conditions: for rats it ranges from 31-108 mg/kg; for rabbits 400-4700 mg/kg., non-irritant to their skin or eyes. Acute inhalation LC_{50}(4-h) for rats *c.* 0.05 mg/l air. In 2-y feeding trials NEL for rats and dogs was 1 mg/kg diet (0.05 mg/kg daily). LC_{50}(48-h): for harlequin fish 0.27 mg/l; for guppies 0.53 mg/l; LC_{50}(96-h) for harlequin fish 0.32 mg/l. It is slightly toxic to honeybees. It is rapidly and completely metabolised in mammals and metabolites are eliminated within a few days. ADI for man 0.002 mg/kg.

Formulations.

These include: EC (200-1000 g/l) for veterinary use, EC (240 g a.i./l), WP (250 g/kg), DP (50 g/kg), GR (100 g/kg); emulsifiable spraying oils for citrus (37.5 or 50 g/l); seed treatments (liquids).

Analysis.

Product analysis is by glc (*CIPAC Handbook*, 1980, **1A**, 1131; FAO Specification (CP/66)). Residues may be determined by glc (*Pestic. Anal. Man.*, 1979, **I**, 201-I; 1979, **II**; D. C. Abbott *et al.*, *Pestic. Sci.*, 1970, **1**, 10; M. A. Luke *et al.*, *J. Assoc. Off. Anal. Chem.*, 1981, **64**, 1187; A. Ambrus *et al.*, *ibid.*, p. 733; R. Mestres *et al.*, *Trav. Soc. Pharm. Montpellier*, 1979, **39**, 323; K. I. Beynon *et al.*, *J. Sci. Food Agric.*, 1968, **19**, 302).

PYRETHROID COMPOUNDS ACT ON NERVES, PROLONGING ANY STIMULATION. THEY PASS EASILY THROUGH THE CUTICLE OF INSECTS.

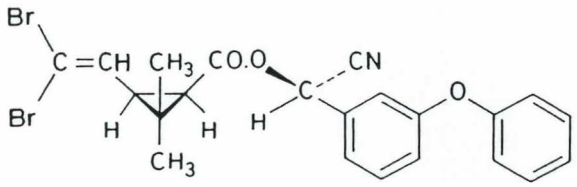
THEY ARE HIGHLY BIO-ACTIVE AND USED IN HIGH DILUTION. THEREFORE THE HAZARD OF FORMULATIONS TO HUMANS IS LOW.

PYRETHROIDS ARE RAPIDLY BROKEN DOWN AND EXCRETED FROM THE BODY. THEY ARE NOT STORED IN THE BODY, AND THEIR EFFECTS DO NOT ACCUMULATE.

Examples with hazard class of technical product:

biollethrin (II)	deltamethrin (II)	allethrin (III)
cyhalothrin (II)	fenvalerate (II)	resmethrin (III)
cypermethrin (II)	permethrin (II)	bioresmethrin (Table 5)

$C_{22}H_{19}Br_2NO_3$(505.2)
L3TJ A1 A1 BVOYCN&R COR&& C=
1UYEE &&(1R)-CIS-(S) FORM



Nomenclature and development.

Common name deltamethrin (BSI, E-ISO); deltamethrine ((*f*) F-ISO). Chemical name (IUPAC) (*S*)-α-cyano-3-phenoxybenzyl (1*R*,3*R*)-3-(2,2-dibromovinyl)-2,2-dimethylcyclopropanecarboxylate; (*S*)-α-cyano-3-phenoxybenzyl (1*R*)-*cis*-3-(2,2-dibromovinyl)-2,2-dimethylcyclopropanecarboxylate. (*C.A.*) [1*R*-[1α(*S**),3α]]-cyano(3-phenoxyphenyl)methyl3-(2,2-dibromoethenyl)-= 2,2-dimethylcyclopropanecarboxylate (9CI); Reg. No. *[52918-63-5]*. Trivial name *decamethrin* (rejected common name proposal). OMS 1998. This single isomer, first described by M. Elliott *et al.* (*Nature (London)*, 1974, **248**, 710), and reviewed in *Deltamethrin Monograph* and by J. Tessier (*Chemy. Ind.*, 1984, p. 199) was introduced by Roussel Uclaf (GBP 1 413 491 to NRDC) as code no. 'NRDC 161', 'RU 22 974' (Roussel Uclaf); trade mark 'Decis' for agronomic uses, 'K-Othrine' for domestic industrial public health and stored products uses, 'Butox', 'Butoflin' both for veterinary uses.

Properties.

Esterification of the parent acid with the racemic mandelonitrile yielded the (*RS*)-α-cyano-3-phenoxybenzyl (1*R*)-*cis*-isomeric pair, known by the code no. 'NRDC 156', (Reg. No. *[52820-00-5]*), (M. Elliott *et al.*, *Pestic. Sci.*, 1978, **9**, 105). A solution of this in hexane deposited crystals of one isomer, deltamethrin, on cooling. The technical material produced industrially by Roussel Uclaf contains ⩾98% deltamethrin *m/m* and is a colourless crystalline powder; m.p. 98-101 °C; $[\alpha]_D$+61° (40 g/l benzene); v.p. 0.002 mPa (25 °C). Solubility (20 °C): 0.002 mg/l water; 500 g/l acetone; 450 g/l benzene, dimethyl sulphoxide;750 g/l cyclohexanone; 900 g/l dioxane; 15 g/l ethanol; 250 g/l xylene. It is stable on exposure to air and sunlight, and more stable in acid than in alkaline media.

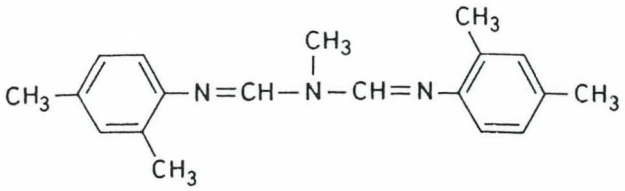
Uses.

It is a potent insecticide, effective as a contact and stomach poison against a wide range of insects. It controls numerous insect pests of top fruit, vegetables and field crops. It has a very good residual activity also for outdoor uses (cattle dip, field crops, mosquito control) and for indoor uses (crawling and flying insects, stable flies and stored products insects).

Toxicology.

Acute oral LD_{50}: for rats ranges from 135-5000 mg/kg depending upon carrier and conditions of the study; for dogs >300 mg/kg;for ducks >4640 mg/kg. Acute percutaneous $LD_{50}$for rats >2000 mg/kg. Acute inhalation $LD_{50}$for rats 0.60 mg/l air. Acute oral $LD_{50}$for formulations in rats was: 1080 mg (of 150 g/l EC)/kg; 535 mg (of 250 g/l EC)/kg; >5000 mg (of 5 g/l UL)/kg; no LD_{50}could be attained at rates of 16 000 mg (of 25 g/kg WP)/kg or 40 000 mg (of 25 g/l

$C_{19}H_{23}N_3$(293.4)
1R C1 DNU1N1&1UNR B1 D1



Nomenclature and development.

Common name amitraz (BSI, E-ISO, ANSI, ESA, BPC, JMAF); amitraze ((*m*) F-ISO). Chemical name (IUPAC)
N,*N*′[(methylimino)dimethylidyne]di-2,4-xylidine;
N-methylbis(2,4-xylyliminomethyl)amine;
N,*N*-bis(2,4-xylyliminomethyl)methylamine. (*C.A.*)
N′-(2,4-dimethylphenyl)-*N*-[[(2,4-dimethylphenyl)imino]methyl]-*N*-= methylmethanimidamide (9CI);
N-methyl-*N*′-2,4-xylyl-*N*-(*N*-2,4-xylylformimidoyl)formamidine (8CI); Reg. No. *[33089-61-1]*. Trivial name 2-methyl-1,3-di(2,4-xylylimino)-2-azapropane (incorrect nomenclature). OMS 1820; ENT 27 967. Its acaricidal properties were described by B. H. Palmer *et al.* (*Proc. Int. Congr. Acarol. 3rd*, 1971, p.687) for veterinary use and by D. M. Weighton *et al.* (*Meded. Fac. Landbouwwet. Rijksuniv. Gent*, 1972, **37**, 765) for crop use. Introduced by The Boots Co. Ltd (now FBC Limited - a subsidiary of Schering AG) (GBP 1 327 935) as code no. 'BTS 27 419'; trade marks 'Mitac' for crop protection, 'Taktic' for animal health (FBC Limited), 'Triatox' (Wellcome).

Properties.

Amitraz forms colourless monoclinic needles; m.p. 86-87 °C (I. R. Harrison *et al.*, *Pestic. Sci.*, 1972, **3**, 679; 1973, **4**, 901); v.p. 0.051 mPa (20 °C). Solubility (room temperature): *c.* 1 mg/l water; >300 g/l acetone, toluene. It is unstable at pH<7 and a slow deterioration of the *moist* compound occurs on prolonged standing.

Uses.

It is an acaricide and insecticide effective against a wide range of phytophagous mites and insects. All stages of mites are susceptible. It is effective against *Bemisia tabaci*, *Psylla pyricola*, scale insects, mealy bugs and aphids. It also has activity against the eggs of various species of Lepidoptera such as *Heliothis zea*, *Spodoptera littoralis*, *Pectinophora gossypiella*, and *Earias* spp. It is relatively non-toxic to predatory insects. Its main uses are on citrus, cotton and top fruit. Its main veterinary uses are against ticks, mites and lice of cattle, dogs, goats, pigs and sheep. it is effective against strains of ticks resistant to other chemical classes of ixodicide. The compound persists long enough on hair and wool to control all stages of the parasite. The unique expellent action of amitraz causes ticks to withdraw mouthparts rapidly and fall off the host animal.

Toxicology.

Acute oral LD_{50}: for rats 800 mg/kg; for mice >1600 mg/kg. Acute percutaneous $LD_{50}$for rats >1600 mg/kg. In 2-y feeding trials no adverse effect was observed in rats receiving 50 mg/kg diet, or in dogs dosed 0.25 mg/kg daily. LC_{50}(8-d) for mallard duck is 7000 mg/kg diet, for Japanese quail 1800 mg/kg diet. Low toxicity to honeybees: $LD_{50}$by ingestion 0.012 mg a.i./bee, $LC_{50}$by direct spray 3.6 g (20% EC)/l, residual contact/fumigant >10 g a.i. (as 20% EC)/l. LC_{50}(48-h) is: for trout 2.7-4.0 mg/l; for Japanese carp 1.17 mg/l; LC_{50} (96-h) is: for bluegill 1.3 mg/l, for harlequin 3.2-4.2 mg/l. ADI for man 0.003 mg/kg.

Formulations.

These include: 'Baam' (Upjohn), 'Mitac' (FBC Limited), EC (200 g/l); 'Baam', 'Mitac', WP (500 g/kg) for crop use; 'Taktic', EC (125 g/l) and WP (250 or 500 g/kg) for farm animal use; 'Ectodex', EC (50 g/l) for dogs.

Analysis.

Product analysis is by glc. Residues may be determined by glc. Details of both methods are available from FBC Limited.